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Impact of integrated nutrient management on growth, seed yield and quality of mustard (*Brassica juncea* L.)

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Abstract
A field experiment was conducted at Experimental Research Farm Janta Mahavidyalaya Ajitmal, Auraiya during 2015-16 to investigate the impact of integrated nutrient management on growth, seed yield and quality of mustard. The treatments consisted of different treatment *viz.*, T_1- Control, T_2 -100 % RDF, T_3 - FYM @2.5t ha^{-1}+Sulphur @30 kg ha^{-1}, T_4 – Azotobactor (Seed treat.), T_5 -75% RDF+ FYM 2.5t ha^{-1}+Sulphur (30 kg ha^{-1}), T_6 -75% RDF+ Azotobactor (Seed treat.) and T_7-75% RDF+ FYM 2.5t ha^{-1} + Azotobactor(Seed treat.) + Sulphur (30 kg ha^{-1}) replicated three times in randomized block design. Application of 75% RDF+ FYM 2.5t ha^{-1} + Azotobactor (Seed treat.) + Sulphur (30kg ha^{-1}) reported maximum plant height, number of primary branches $plant^{-1}$, number of secondary branches $plant^{-1}$, number of siliqua $plant^{-1}$, number of seed $siliqua^{-1}$, test weight and higher seed yield. Treatment combination T_7 showed maximum root length, shoot length and seed vigour index over control.

Keywords: RDF, FYM, azotobacter, FYM, growth, seed quality and seed yield

Introduction
Indian mustard belongs to family Brassicacae and genus *Brassica*. Indian mustard [*Brassica juncea* (L.) Czern & Coss] is a natural amphidiploids (2n =36) of *Brassica rapa* (2n = 20) and *Brassica nigra* (2n = 16). Mustard is largely self pollinated but certain amount (2 - 15%) of cross pollination may take place due to honeybees. It contributes more than 13 per cent to the global production of edible oil. Its oils and fats are used in cosmetics, soaps, lubricants, paints and varnish industries and their medicinal and therapeutic value. The requirement of vegetable oils and fats will be much higher in coming years in view of ever increasing population. In India the area of rape and mustard 5.92Mha, Production 6.78MT and yield 1145kg/ha in 2014-15 (Anonymous, 2014) [1]. Seed contain 38 to 40 per cent oil and is mainly utilize for human consumption throughout Northern India for cooking as well as frying purpose. A high yielding genotype may/may not transmit its superiority to its progeny. For International acceptance, erucic acid content should be <2%.

Sulphur is key nutrient for oilseed production, because in the plants, sulphur is directly involved in the formation of oil compounds. If crop suffering from S deficiency, not only produce low yield but the oil content in the seed is also low. Under such situation organic manures can be exploited to boost the soil health condition vis-a-vis production of crops and to improve fertilizer use efficiency. The use of organic and inorganic nutrient and biofertilizers sources has some limitations (Kandpal, 2001) [4]. Balanced combination of FYM, biofertilizers and chemical fertilizers facilitate profitable and sustainable production (Singh and Sinsinwar, 2006) [8]. Keeping this in view, application of integrated nutrient management is the supply of the required plant nutrients for sustaining the desired crop productivity with minimum deleterious effect on soil health environment.

Materials and Methods
Field experiment was conducted at Experimental Research Farm Janta Mahavidyalaya Ajitmal, Auraiya during 2015-16 to investigate the impact of integrated nutrient management on growth, seed yield and quality of mustard. The soil of the experimental field was sandy loam having pH 7.1, organic carbon 0.52%, available nitrogen 162.7 kg N ha^{-1}, available phosphorus 18.5 kg P ha^{-1}, available potassium 200.3 kg K ha^{-1}.The experiment consisted of seven treatments *viz.*, T_1- Control, T_2 -100 % RDF, T_3 - FYM @2.5t ha^{-1}+Sulphur @30 kg ha^{-1}, T_4 – Azotobactor (Seed treat.), T_5 -75% RDF+ FYM 2.5t ha^{-1}+Sulphur (30 kg ha^{-1}), T_6 -75% RDF+ Azotobactor(Seed treat.) and T_7-75% RDF+ FYM 2.5t ha^{-1} + Azotobactor

(Seed treat.) + Sulphur (30 kg ha^{-1}) laid out in randomized block design with three replications. The inorganic fertilizers were supplied through urea, diammonium phosphate, muriate of potash and gypsum. The mustard variety Maya was sown in rows 30x15 cm on 20th October 2015 respectively. Thinning was done 15 days after sowing to maintain plant population. The FYM was applied in furrows 15 days before sowing as per treatment. Full dose of phosphorus, potassium, half of nitrogen (as per treatment) and sulphur were applied at the time of sowing. Remaining half of nitrogen was applied after first irrigation. The crop was harvested in the month of March. Recording of data of different character *viz.* plant height, number of primary branches $plant^{-1}$ and number of secondary branches $plant^{-1}$, number of siliqua $plant^{-1}$, number of seed $siliqua^{-1}$, test weight and higher seed yield, germination percentage, root length, shoot length and seed vigour index as per schedule. Statistical analysis was based on the method analysis of variance as suggested by Panse and Sukhatme (1967) [7] and the standard error difference was computed by at 5 % and 1 % level of significance.

Results and Discussion

The results revealed that growth parameters *viz.* plant height, number of primary branches $plant^{-1}$, number of secondary branches $plant^{-1}$ increased with the successive addition of sulphur, FYM and *Azotobacter* with 75 % of RDF showed significant differences (Table 1). Maximum plant height (188.56 cm), number of primary branches $plant^{-1}$ (7.18) and number of secondary branches $plant^{-1}$ (12.12) were recorded with the integrated application of 75% RDF along with, sulphur, FYM and *Azotobacter* (Seed treatment) was significantly superior followed by T_2, T_5, T_6, T_3, and T_4. While minimum plant height (157.20 cm), number of primary branches per plant (4.12) and number of secondary branches per plant (6.97) were recorded in T_1 (control). The maximum number of siliqua $plant^{-1}$ (201.00) was recorded in T_7 (75% RDF+ FYM 2.5t ha^{-1} + Azotobactor(Seed treated) + Sulphur (30 kg ha^{-1}) which was significantly superior over T_2, T_5, T_6, T_3, and T_4 having 196.30, 194.20, 191.50, 189.70, and 186.20 number of siliqua $plant^{-1}$ respectively. All these treatments were statistically at par. Minimum number of siliqua $plant^{-1}$ (168.00) was recorded in T_1 (control) which showed significant differences among all the treatments. Maximum number of seed $siliqua^{-1}$ (12.01) and seed yield (18.01ha^{-1}) were recorded in treatment T_7 (75% RDF+ FYM 2.5t ha^{-1} + Azotobactor (Seed treat.) + Sulphur (30 kg ha^{-1}), while minimum number of seed $siliqua^{-1}$ (9.56) and seed yield (13.70ha^{-1}) were recorded in control. The maximum 1000 seed weight (6.15 g) were recorded in treatment T_7 (75% RDF+ FYM 2.5t/ha + Azotobactor (Seed treat.) + Sulphur (30 kg ha^{-1}), whereas minimum values of 1000 seed weight (5.70 g) were recorded control. All the growth parameters increases with INM it might be due to organic manures, sulphur, biofertilizers releases some macro/micro nutrients and some growth promoting substances resulting increases cell division, cell enlargement which increases rate of photosynthesis, reduced respiration/transpiration, increases primary/ secondary branches, number of siliqua/ seed, deep root system, increases water/nutrients uptake and translocation of solute from source to sink. This finding also corroborated with the results of Dhaka and Kumar (2003) [2], Singh *et al.*, (2012) [8], Kumar *et al.*, (2018) [5].

The highest germination percentages (92.40%) was recorded in treatment T_7 (75% RDF+ FYM 2.5t/ha + Azotobactor (Seed treat.) + Sulphur (30 kg ha^{-1}), which was statistically at par with treatments T_2 (91.30%), T_5 (90.60%), T_6 (89.50%), T_3 (89.70%), and T_4 (88.90%). The lowest germination percentages (88.20%) were recorded in the control plot (T_1).

Maximum root length (7.15cm) and shoot length (7.34 cm) were recorded in treatment T_7 (75% RDF+ FYM 2.5t ha^{-1} + Azotobactor (Seed treat.) + Sulphur (30 kg ha^{-1}), whereas minimum values of root length (4.50 cm) and shoot length (3.56 cm) were recorded under the control. The maximum seed vigour index (1338.88) was recorded in treatment T_7 (75% RDF+ FYM 2.5t ha^{-1} + Azotobactor (Seed treat.) + Sulphur (30 kg ha^{-1}), followed by T_2 (1256.29), T_5 (1097.17), T_6 (1054.31), T_3 (984.91), and T_4 (944.12). The minimum seed vigour index (710.89) was recorded in T_1 (control). It may be due to biofertilzers releases many macro, micro nutrient as well as growth promoting substances which enhances the cell division and cell enlargement and also increases water/nutrients absorption, translocation of solute resulting more accumulation of photosynthete which was translocate from source to sink. Similar results were also reported by earlier Singh *et al.*, (2006) [8], Tripathi *et al.*, (2011) [9], Hardev *et al.*, (2013) [3], Kumawat *et al*., (2014) [6], Kumar *et.al.*, (2018) [5].

Table 1: Impact of Integrated Nutrient Management on Growth, Seed yield and Quality of Mustard (*Brassica juncea L.*)

Treatment	Plant height (cm.)	Number of primary branches $plants^{-1}$	Number of secondary branches $plant^{-1}$	Number of siliqua $plant^{-1}$	Number of seeds $siliqua^{-1}$	Seed yield qha^{-1}	1000 seed weight	Germination %	Root length (cm)	Shoot length (cm)	Seed vigour index
T_1	157.20	4.12	6.97	168.00	9.56	13.70	5.70	88.20 (69.91)	4.50	3.56	710.89
T_2	186.40	6.93	11.56	196.30	11.87	17.40	6.10	91.30 (72.84)	6.98	6.78	1256.29
T_3	169.20	6.25	8.93	189.70	10.90	16.50	5.90	89.70 (71.23)	5.82	5.16	984.91
T_4	165.70	6.12	9.56	186.20	10.50	16.30	5.87	88.90 (70.54)	5.50	5.12	944.12
T_5	179.50	6.81	10.90	194.20	11.75	17.31	6.04	90.60 (72.15)	6.10	6.01	1097.17
T_6	176.20	6.67	10.45	191.50	11.42	16.70	5.92	89.50 (71.09)	5.98	5.80	1054.31
T_7	188.56	7.18	12.12	201.00	12.01	18.01	6.15	92.40 (74.00)	7.15	7.34	1338.88
S.Em±	5.28	0.44	0.57	5.13	0.40	0.58	0.09	0.64	0.24	0.25	18.53
CD at 5%	16.26	1.35	1.77	15.81	1.24	1.79	0.27	1.93	0.73	0.77	56.20

References

1. Anonymous. Agricultural Statistics at a Glance. Department of Agriculture and Co-operation, Ministry of Agriculture, Govt. of India, 2014.
2. Dhaka AK, Kumar, Satish. Response of fertility levels and organic sources on late planted raya. Annals of Biology. 2003; 19(2):129-133.
3. Hardev Ram, Yadav DS, Jat RD. Effect of nutrient management on growth, yield attributes and yield of Indian mustard (*Brassica juncea*). Annals of Agri. Bio. Res. 2013; 18:132-134.
4. Kandpal BK. Integrated nutrient management in relation to growth, yield and quality of Brassica carinata A. Braun

and its residual effect on succeeding rice. Ph. D Thesis, G.B.P.U.A &T, Pantnagar, 2001.

5. Kumar H, Yadav DD, Saquib M, Chahal VP, Yadav R, Yadav OS. Effect of integrated nutrient management (INM) on productivity and profitability of chickpea. Int. J Chem. Studies. 2018; 6(6):1672-1674.
6. Kumawat Amit, Pareek BL, Yadav RS, Rathore PS. Effect of integrated nutrient management on growth, yield, quality and nutrient uptake of Indian mustard (Brassica juncea) in arid zone of Rajasthan. Indian J. of Agronomy. 2014; 59:119-123.
7. Panse GV, Sukhatme VP. Statistical Methods for Agric. Worker, Indian Council of Agricultural Research, New Delhi, 1976.
8. Singh R, Sinsinwar BS. Effect of integrated nutrient management on growth, yield, oil content and nutreint uptake of Indian mustard (*Brassica juncea*). Indian J Agric. Sci. 2006; 76:322-24.
9. Tripathi MK, Chaturvedi S, Shukla DK, Saini SK. Influence of integrated nutrient management on growth, yield and quality of Indian mustard (*Brassica juncea* L.) in tarai region of northern India. Journal of Crop and Weed. 2011; 7:104-107.